Remarks

The above Amendments and these Remarks respond to the Office Action mailed 15 June 2005. No fee is due for the addition of any new claims. An appropriate Petition for Extension of Time to Respond is submitted herewith, together with the appropriate fee.

Claims 1-20 remain pending in the application. Claims 19 and 20 have been allowed, Claims 3, 4, 9 and 12 are objected to as depending from a rejected base claim but allowable if rewritten in independent form containing all limitations of the base claim and intervening claims, and Claims 1, 2, 5-8, 10, 11, and 13-18 stand rejected.

The Examiner's continuing rejection of the claims herein hangs by a single thread – the meaning of the word "consequent." As shown below, the Examiner's erroneous interpretation of that word has produced results that cannot be supported.

Rejections under Section 103 based on Soref

The critical cited reference in this application is U.S. Patent No. 5,838,870, to Soref, and the critical question is whether Soref teaches selecting the height of the mesa formation underlying the waveguide structure to substantially eliminate birefringence. The Examiner does not argue that Soref directly teaches varying the mesa height, or indeed that Soref discusses mesa height at all – clearly, Soref is entirely silent on that point. Soref's attention, rather, is focused on creating a difference between the refractive indices of the waveguide material and the undercladding. It is instructive to consider the entirety of Soref's teaching on this point:

> If the barrier regions between QWs have a wide bandgap (which is optimum), then the index of refraction of the MQW "averaged" over 150 nm of height is slightly less

> than the Si index, for example, n_{ave} .~.3.1. At first glance, this would seem to make the MQW waveguide leaky. However, the insulator layer 3 below the strip, and the oxide layer 5 (or air) above the strip, offer very strong trapping of light in the MQW of FIGS. 2c,e,f which is an important aspect of the invention. Thus, guiding is strong in the SOI p-i-n MQW strip.
>
> A key aspect of the insulating lower cladding layer (SOI construction) is that it makes possible high-Q optical resonators in the strip guide as shown in FIG. 4, because of the large index step and the consequent optical isolation.
>
> Col. 5, lines 17-31

That discussion makes clear that Soref seeks to enhance the light-trapping characteristics of his waveguide structure, and he accomplishes that result by providing a large difference in refractive index between the waveguide material and the undercladding.

The Examiner, however, bootstraps that teaching into a generalized lesson that Soref shows that high-Q resonators result from optical isolation of the waveguide, and that optical isolation is a result of mesa height. In making the latter argument, however, the Examiner departs from Soref and ventures off on a tangent, which is where the meaning of "consequent", in the last line quoted above, enters the scene.

The Examiner argues as follows:

> In contrast to Applicant's assertion that the cited language of Soref teaches that it is the large step in index of refraction (not the mesa structure) that makes high-Q optical resonators possible, Soref' s actual language (as Applicant stated above) clearly states that high-Q optical resonator is made possible because of the large index step **and** the consequent optical isolation (not only because of "the large step in index of refraction" as Applicant asserts). Soref discloses that the first cladding layer structure, which includes the mesa formation, makes possible high Q optical resonators in the waveguide because of the optical isolation provided by the mesa formation and an oxide layer formed above the core (column 5, lines 22-31).

Final Office Action at 7 (emphasis and citation in original).

Two points clearly emerge from a comparison of the Examiner's argument to Soref's language. First, the Examiner is simply wrong about the meaning of the word "consequent." The Examiner treats that word as creating a disjunction between the index step and optical isolation. To the contrary, "consequent" means "Following as a natural effect, result or conclusion", *American Heritage College Dictionary* (3d ed. 2000) at 296. Far from indicating an effect separable from the index step, Soref teaches plainly that optical isolation is the natural effect, result or conclusion of that step. Indeed, far from giving meaning to the word "consequent", the Examiner reads it out of the sentence. The Examiner's reading would scan only if the phrase read "made possible because of the large index step **and** the optical isolation", which would refer to two causative elements. But it does not read that way, and the word "consequent" ties the result (optical isolation) to a cause (index step).

Second, Soref suggests no other possible cause for the optical isolation taught there. Soref uses the word "isolation" three times in the '870 patent (Abstract, line 3; col. 2, line 12; col. 5, line 31). Only the last of these, discussed above, suggests how that isolation is achieved. Tellingly, Soref uses the word "mesa" only once (col. 3, line 32), and he suggests no dimensions or structural details for that structure.

The only source for the link between waveguide performance and mesa structure is thus the Examiner's hindsight. That conclusion becomes clear in the Examiner's bald statement that "it is obvious that since the height of the mesa formation determines the degree of optical isolation, which in turn determines Qvalue, the height of the mesa formation causes variation of birefringence level." Final Office Action at 9. There is only one place from which the Examiner

could have learned that varying the height of the mesa formation can have an effect on birefringence – the present application.

The failure of Soref as an effective reference leaves the Section 103 rejections without foundation. None of the remaining cited references suggests approaching the birefringence issue by varying the mesa height. Indeed, Tarazona, U.S. Patent 6,453,086, teaches directly away from Applicant's claims. There, it is recognized that birefringence is related to unrelieved strain in the waveguide structure, but instead of the simple, elegant solution proposed by Applicant, Tarazona introduces a piezoelectric rib to produce compensating strain. That disclosure clearly fails to teach any of the principles advanced in the present application, and it has nothing to add to the index-step of Soref.

At bottom, none of the cited references combine with Soref to teach the claims herein.

Other Matters and Conclusion

In light of the above, it is respectfully submitted that all of the claims now pending in the subject patent application should be allowable, and a Notice of Allowance is requested. The Examiner is respectfully requested to telephone the undersigned if he can assist in any way in expediting issuance of a patent.

Enclosed is a PETITION FOR EXTENSION OF TIME UNDER 37 C.F.R. 1.136 for extending the time to respond up to and including October 15, 2005.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 50-0869 (Docket No. GEML 4420-3) for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

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